









GENERAL NOTES - ELECTRICAL

- 1 - FOR ELECTRICAL LEGEND SEE DRAWING #E-1.
- 2 - ALL CONDUIT SHALL BE RIGID STEEL, NOT DIPPED GALVANIZED WITH THREADED FITTINGS.
- 3 - ALL WIRE SHALL BE 600 VOLT, 1/C COPPER, TYPE XHHW-2, VW-1, 90°C, SUITABLE FOR DRY AND WET LOCATIONS, UNLESS OTHERWISE NOTED.
- 4 - ALL FIRE ALARM WIRES SHALL BE CLASS-C AND MEA APPROVED PER N.Y.C. LOCAL LAW #5.
- 5 - ALL METAL RACEWAYS, BOXES, ENCLOSURES, MOTORS AND LIGHTING FIXTURES SHALL BE GROUNDED IN AN APPROVED MANNER.
- 6 - DEVICE PLATES SHALL BE TYPE 302 STAINLESS STEEL.
- 7 - ALL EXISTING PANEL DIRECTORIES SHALL BE UPDATED TO REFLECT ALL CHANGES DUE TO THIS CONTRACT.
- 8 - ALL PENETRATIONS THROUGH FIRE RATED PARTITIONS OR FLOORS SHALL BE FIRE STOPPED WITH 3M FIRE SEAL FOAM OR APPROVED EQUAL (SEE ARCH. DWG'S).
- 9 - ALL OPENINGS MADE DUE TO REMOVAL OR INSTALLATION OF ELECTRICAL DEVICES, EQUIPMENT OR RACEWAYS SHALL BE SEALED IN AN APPROVED MANNER (SEE ARCH. DWG'S).
- 10 - ALL CONDUITS PASSING THROUGH FLOOR SLABS SHALL HAVE WATERPROOFING COMPOUND INSTALLED IN JOINTS BETWEEN CONDUIT AND FLOOR SLEEVE TO PREVENT PASSAGE OF LIQUIDS FROM FLOOR TO FLOOR.
- 11 - THE CONTRACTOR WILL BE REIMBURSED FOR THE FOLLOWING WORK AT "NET COST", SEE SPECIFICATIONS, FOR THE FOLLOWING WORK:
 - a) REMOVAL, RELOCATIONS AND/OR REPLACEMENT OF EXISTING UTILITY SERVICES WHICH ARE NOT INDICATED ON THE CONTRACT DRAWINGS AND WHICH OBSTRUCT THE INSTALLATION OF WORK OF THIS CONTRACT WHEN SO DIRECTED BY THE ENGINEER.
 - b) THE SALVAGE, FOR USE BY THE AUTHORITY, OF COMPONENTS OF EXISTING ELECTRICAL EQUIPMENT WHICH ARE TO BE REMOVED AS PART OF THIS CONTRACT AND ARE NOT SPECIFICALLY MENTIONED IN THE SPECIFICATIONS OR ON THE DRAWINGS, WHEN SO DIRECTED BY THE ENGINEER.
 - c) PROVIDING TEMPORARY ELECTRIC LIGHT AND/OR POWER TO TENANT AREAS DURING SHUTDOWNS OF ELECTRICAL SYSTEMS, WHEN SO DIRECTED BY THE ENGINEER.
- 12 - ALL EQUIPMENT SHOWN TO BE REMOVED SHALL HAVE ALL ASSOCIATED CONDUIT, WIRING AND JUNCTION BOXES REMOVED UNLESS OTHERWISE NOTED.
- 13 - ALL EXISTING LIGHTING FIXTURE TO BE RELOCATED SHALL BE CLEANED AND BALLAST(S) REPLACED. LIGHTING FIXTURE SHALL BE REWIRED. ALL BALLASTS THAT CONTAIN "PCB'S" FROM LIGHTING FIXTURES THAT ARE TO BE REMOVED OR TO BE RELOCATED, SHALL BE PLACED IN DRUM SUPPLIED BY THE ENGINEER FOR DISPOSAL BY OTHERS.
- 14 - FINAL CONNECTIONS TO SOLENOID VALVES, MOTORS AND TRANSFORMERS SHALL BE MADE WITH FLEXIBLE METAL CONDUIT.
- 15 - TO MAINTAIN SWITCHGEAR GROUND DETECTION ZONES AS PER SPECIFICATION NON-CONDUCTING MATERIAL SHALL BE USED TO ISOLATE INCOMING CONDUITS AND BUSWAY FROM THE SWITCHGEAR ENCLOSURE.
 - ALL CONDUITS SHALL BE CONNECTED WITH INSULATING NIPPLES, LOCKOUTS AND BUSHINGS.
 - ALL BUSWAY SHALL BE INSULATED WITH 1/4" THICK GPO-3 MATERIAL, CUT TO MATCH THE BUSWAY FLANGE COLLAR AND CONNECTED WITH INSULATED BOLTS, NUTS AND WASHERS.
 - ALL GROUND CONDUCTORS IN CONDUIT AND BUSWAY INTERNAL GROUND BUS SHALL BE CONNECTED TO THE SWITCHGEAR EQUIPMENT GROUND BUS (EGB).

THE CONTRACTOR SHALL SUBMIT DRAWINGS FOR APPROVAL SHOWING METHOD OF FASTENING CONDUIT AND BUSWAY TO SWITCHGEAR, NO PVC MATERIAL SHALL BE USED.
- 16 - THE CONTRACTOR SHALL FURNISH AND INSTALL THE FOLLOWING BUSWAY, COMPLETE WITH ALL FITTINGS, AS SHOWN ON THE CONTRACT DRAWINGS AND AS DESCRIBED BELOW.
 - *2000 AMP. BUSWAY
 - THE 2000 AMP. BUSWAY SHALL BE:
 - A - 3 PHASE 4 WIRE, FULL NEUTRAL WITH A SINGLE COPPER BUS BAR PER PHASE & NEUTRAL.
 - B - 50% INTERNAL GROUND.
 - C - 600 VOLT RATING, FOR UTILIZATION ON A 480/277 VOLT, OR 208/120 VOLT DISTRIBUTION SYSTEM.
 - D - BUSWAY SHALL BE SQUARE "D" CO. 1 LINE II CLASS S600, G.E. SPECTRA SERIES OR APPROVED EQUAL.
 - E - BUSWAY INSULATION SHALL BE NON PVC.
 - *4000 AMP. TEMPORARY BUSWAY
 - THE 4000 AMP. BUSWAY SHALL BE THE SAME AS THE 2000 AMP. BUSWAY ABOVE EXCEPT:
 - A - NO MORE THAN THREE COPPER BUS BARS PER PHASE AND NO MORE THAN THREE COPPER BUS BARS PER NEUTRAL.

THE CONTRACTOR SHALL SUBMIT FOR APPROVAL FULLY DIMENSIONED SHOP DRAWINGS OF ALL BUSWAY RUNS, INDICATING FITTINGS, HARDWARE AND EXISTING BUSWAY CONNECTION DETAIL. INFORMATION FOR THE CONNECTION TO THE 4000 AMP., 600V BUSWAY FURNISHED BY THE AUTHORITY WILL BE PROVIDED TO THE CONTRACTOR. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS ASSOCIATED WITH BUSWAY RUNS PRIOR TO SHOP DRAWINGS SUBMITTALS.
 - 17 - ALL HVAC REMOTE CONTROL CABLE SHALL BE: PLENUM CABLE SOLID COOPER CONDUCTORS #18 AWG TWISTED PAIR TEFION INSULATION ON INDIVIDUAL CONDUCTORS AND TEFLON OUTER JACKET, 200°C, COLOR CODED AS PER ICEA TYPE CL2P CONFORMING TO NEC 725-2(6) CLASS 1, MANUFACTURED BY HELIX HI TEMP CABLES, SIGNAL CABLE, NEX CABLE OR APPROVED EQUAL.
 - 18 - ALL MEDIUM VOLTAGE CABLE SHALL BE 15KV., SINGLE CONDUCTOR COPPER, CLASS B STRANDED, ETHYLENE-PROPYLENE-RUBBER INSULATED, (133% INSULATION LEVEL) WITH INSULATION SHIELDING, POLYETHYLENE JACKET, AND NON-LEAD COVERED. SINGLE CONDUCTOR MEDIUM VOLTAGE CABLE SHALL BE QUADRIPLEXED.
 - 19 - PROVIDE OPERATING AND MAINTENANCE MANUAL REPRESENTING ONE TYPICAL SUBSTATION OUT OF SIX. THE CONTENT AND FORMAT OF THESE MANUALS SHALL BE AS PER SECTION 16001 OF THE SPECIFICATIONS.
 - 20 - ALL TERMINAL BLOCKS SHALL BE SOLDERLESS BOX LUG TERMINATIONS AS PER SPECIFICATIONS.
 - 21 - ALL 600V WIRES #6 AWG AND LARGER SHALL BE FIELD TESTED AS PER SECTION 16120 OF THE SPECIFICATIONS.
 - 22 - PARAGRAPH 3.08-D, OF SECTION 1600 OF THE SPECIFICATIONS PERTAINING TO THERMOGRAPHICAL EQUIPMENT INSPECTION DOES NOT APPLY TO THIS CONTRACT.

LIGHTING FIXTURE SCHEDULE

SYMBOL	DESCRIPTION	LAMP QUANTITY WATTAGE AND TYPE	BALLAST	VOLTAGE	FIXTURE	REMARKS
 TYPE "F1"	FLUORESCENT FIXTURE - TARRIT INDUSTRIAL TYPE, WITH 20% UPLIGHT, 4 FT. LONG, 2 LAMP SUSPENDED MOUNTING TYPE. NUMERAL INDICATES CIRCUIT.	(2) 40 WATT, RAPID START, COOL WHITE, T10, 5000K, 3700 LUMENS, F40X50 ADVANTAGE X BY PHILLIPS OR EQUAL BY "G.E."	SOLID STATE ELECTRONIC, 2 LAMP, RAPID START TYPE, MAGNETEK CAT.# B240R-HP OR EQUAL BY "EBT" OR "ADVANCE".	277	LUMAX CAT. #TS24048-BH1BA OR EQUAL BY "DAY-BRITE" OR "G.E."	USE INSIDE ELECTRICAL SUBSTATIONS INSTALL 10" A.F.F.
 TYPE "F2"	SAME AS TYPE "F1" ABOVE EXCEPT FOR USE ON 120V EMERGENCY CIRCUIT	(2) 40 WATT, RAPID START, COOL WHITE, T10, 5000K, 3700 LUMENS, F40X50 ADVANTAGE X BY PHILLIPS OR EQUAL BY "G.E."	SOLID STATE ELECTRONIC, 2 LAMP, RAPID START TYPE, MAGNETEK CAT.# B240R-HP OR EQUAL BY "EBT" OR "ADVANCE".	120 (EMERGENCY SOURCE)	LUMAX CAT. #TS24048-BH1BA OR EQUAL BY "DAY-BRITE" OR "G.E."	INSTALL 10" A.F.F.
 TYPE "F3"	SAME AS TYPE "F1" ABOVE EXCEPT WALL MOUNTING TYPE	(2) 40 WATT, RAPID START, COOL WHITE, T10, 5000K, 3700 LUMENS, F40X50 ADVANTAGE X BY PHILLIPS OR EQUAL BY "G.E."	SOLID STATE ELECTRONIC, 2 LAMP, RAPID START TYPE, MAGNETEK CAT.# B240R-HP OR EQUAL BY "EBT" OR "ADVANCE".	277	LUMAX CAT. #TS24048-BH1BA OR EQUAL BY "DAY-BRITE" OR "G.E."	MINIMUM MTC. HEIGHT SHALL BE 7'-8" TO LOWEST EDGE OF REFLECTOR.
 TYPE "X"	EXIT LIGHT CEILING MOUNTED SELF POWERED TYPE WITH 8" HIGH LETTERS AND NICKEL CADMIUM BATTERY AND CHARGER HOUSED IN A DIE-CAST ALUMINUM HOUSING. NUMERAL INDICATES CIRCUIT	(2) 7 WATT COMPACT FLUORESCENT LAMPS	ELECTRONIC	120 (EMERGENCY SOURCE)	LIGHTALARM'S AFFINITY SERIES OR APPROVED EQUAL	---
 TYPE "X"	EXIT LIGHT SAME AS ABOVE EXCEPT WALL MOUNTED	(2) 7 WATT COMPACT FLUORESCENT LAMPS	ELECTRONIC	120 (EMERGENCY SOURCE)	LIGHTALARM'S AFFINITY SERIES OR APPROVED EQUAL	---
 TYPE "F4"	INCANDESCENT VAPORTIGHT LIGHTING FIXTURE, WALL BRACKET TYPE WITH GLOBE & GUARD & 3/4" HUB. NUMERAL INDICATES CIRCUIT	(1) 100 WATT A-21 FROSTED INCANDESCENT, 100A21 BY G.E. OR EQUAL BY "PHILLIPS" OR "SYLVANIA"	---	120	CROUSE-HINDS CAT.#VXHBF25GP OR EQUAL BY "APPLETON" OR "HUBBELL"	USE IN WALK IN A/C UNITS
 TYPE "F5"	FLUORESCENT FIXTURE-24"x24", RECESSD MOUNTED, WITH HOUSING, 2X40 WATT BIAXIAL FLUORESCENT LAMPS, 3" DEEP, 16 CELL, LOW IRIDESCENT SEMI-SPECULAR ANODIZED ALUMINUM, PARABOLIC LOUVER. NUMERAL INDICATES CIRCUIT	BIAXIAL FLUORESCENT, (2) 40 WATT, RAPID START-PREHEAT, T5, 22.5" LONG, F40BX/SPX41/RS BY G.E. OR EQUAL BY "PHILLIPS" OR "OSRAM".	SOLID STATE ELECTRONIC, 2 LAMP, 277V, RAPID START TYPE, MAGNETEK CAT.# B240R27HP OR "EBT" #SSB1-277-2/40 IT LH NO OTHER BALLAST MANUFACTURES WILL BE ALLOWED.	277	DAYBRITE CAT.#D75170-16RR-02-LR 120V OR EQUAL BY "LIGHTOLIER/KLP" OR "LUMAX"	INSTALL FIXTURES WITH LAMP AXIS PARALLEL WITH CORRIDOR AXIS. USE IN CORRIDORS
 TYPE "F5"	SAME AS TYPE "F5" ABOVE EXCEPT FOR USE ON 120V EMERGENCY CIRCUIT	BIAXIAL FLUORESCENT, (2) 40 WATT, RAPID START-PREHEAT, T5, 22.5" LONG, F40BX/SPX41/RS BY G.E. OR EQUAL BY "PHILLIPS" OR "OSRAM".	SOLID STATE ELECTRONIC, 2 LAMP, 120V, RAPID START TYPE, SAME TYPE AS "F5" EXCEPT "120" IN PLACE OF "277" IN CAT. NOS.	120 (EMERGENCY SOURCE)	DAYBRITE CAT.#D75170-16RR-02-LR 120V OR EQUAL BY "LIGHTOLIER/KLP" OR "LUMAX"	EMERGENCY BATTERY PACK SERIES AM10 BY "LIGHTALARM'S" OR B50 BY "BOHNE" OR APPROVED EQUAL. INSTALL FIXTURES WITH LAMP AXIS PARALLEL WITH CORRIDOR AXIS. USE IN CORRIDORS

ABBREVIATIONS

A, AMP	AMPERES	MCC	MOTOR CONTROL CENTER
A.F.F.	ABOVE FINISHED FLOOR	MISC.	MISCELLANEOUS
AL	ALUMINUM	MTD	MOUNTED
ALD	ANALOG LOOP DRIVER	MTS	MANUAL TRANSFER SWITCH
ARCH	ARCHITECT	N	NEUTRAL
ATS	AUTOMATIC TRANSFER SWITCH	N.C.	NORMALLY CLOSED
BKR	BREAKER	N.I.C.	NOT IN CONTRACT
BLDG	BUILDING	N.O.	NORMALLY OPEN
C.B.	CIRCUIT BREAKER	No. #	NUMBER
C, COT.	CONDUIT	N.T.S.	NOT TO SCALE
CAB	CABINET	P	POLE
CKT	CIRCUIT	PB	PULL BOX
CL	CLOSET	PE	PASSENGER ELEVATOR
CL	CENTERLINE	P.F.	PRIMARY FEEDER (15KV)
CONT.	CONTINUATION	PH, #	PHASE
CU	COPPER	PNL	PANEL
DIP	DIGITAL INSTRUMENT PACKAGE	PP	POWER PANEL
DIST.	DISTRIBUTION	PRI	PRIMARY
DP	DISTRIBUTION PANEL	PR	PAIR
DN	DOWN	RM	ROOM
DO	DRAW OUT	RP	RECEPTACLE PANEL
DWG(S)	DRAWINGS	SECT	SECTION
E.C.	EMPTY CONDUIT	SEL	SELECTOR
ELECT	ELECTRICAL	SH	SHIELDED
ELEV.	ELEVATOR	SP	SPARE
EOL	END OF LINE DEVICES	SW	SWITCH
EXIST	EXISTING	SWGR	SWITCHGEAR
FA	FIRE ALARM	TEL	TELEPHONE
FR	FEEDER	TEMP	TEMPORARY
FL, FLR.	FLOOR	TERM	TERMINAL
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	TRANS, XFMR	TRANSFORMER
GND.	GROUND	TR	TRANSFORMER
G&T	GROUND & TEST DEVICE	TSC	TERMINAL STRIP CABINET
H.V.	HIGH VOLTAGE	TYP	TYPICAL
INST.	INSTALLATION	TW/PR	TWISTED PAIR
J.B.	JUNCTION BOX	U.O.N.	UNLESS OTHERWISE NOTED
KVA	KILOVOLT AMPERES	U.P.S.	UNINTERRUPTIBLE POWER SUPPLY
KW	KILOWATT	V.T.	VOLTAGE TRANSFORMER
LTG	LIGHTING	W/	WITH
LP	LIGHTING PANEL	W/O	WITHOUT
LV	LOW VOLTAGE	WP	WEATHER PROOF

I HEREBY CERTIFY THAT THIS IS A TRUE AND CORRECT COPY OF ONE OF THE CONTRACT DRAWINGS CONSTITUTING A PART OF CONTRACT NO. WTC 802.071 IN THE FORM IN WHICH SAID DRAWINGS EXISTED AT THE TIME THE SAID CONTRACT WAS EXECUTED BY THE PARTIES.

DATE 6/21/95 Sulham A. Aslam SPEC. WRITER
DATE 8/15/95 Peter K. Sweney ENGINEER OF DESIGN

Sheet 88 of 224

THE PORT AUTHORITY
OF NY & NJ

Peter K. Sweney
ENGINEERING PROGRAM MANAGER
WORLD TRADE CENTER
CHIEF ELECTRICAL ENGINEER

Engineering Department
Design Divisions
The World Trade
Center
Electrical/HVAC
Upgrade Program

Title
TOWER ONE AND TWO
LOW VOLTAGE
SUBSTATIONS
CONSTRUCTION AND
INSTALLATION

ELECTRICAL
GENERAL NOTES,
ABBREVIATIONS AND
LIGHTING FIXTURE
SCHEDULE

No. Date Revision Approved

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to Port Authority and may not be used without its written consent.

ROYZMAN
FISCHER
Designed by
ROYZMAN
Drawn by
A.S.
Checked by

Date 5-1-95 Scale NONE

Contract Number
WTC 802.071
Drawing Number
E-2